New records of *Galaxias truttaceus* (Galaxiidae) in the Kent River catchment, southwestern Australia

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Abstract

A number of incidental captures of the Trout Minnow, *Galaxias truttaceus*, have been made recently in the Kent River catchment in southwestern Western Australia. This freshwater galaxiid was thought previously to be confined to a number of river systems east of Albany in Western Australia. Between 2005 and 2009, four specimens of *G. truttaceus* were captured in the Kentdale Creek, which flows into the Kent River west of Denmark. All four specimens were large, presumably mature, individuals, with total lengths (TL) ≥140 mm, and the largest was 12 mm longer than the maximum size previously recorded in Western Australia. The Kentdale Creek dries completely between December and May, and hence it is likely that the fish either move into the adjacent stretch of the Kent River, which continues to flow even during the driest months, or they perish. A dedicated study is required to determine the size, distribution, biology, migration patterns and status of this newly discovered population of the Trout Minnow, Australia's only freshwater fish that is listed as critically endangered.

Keywords: Trout Minnow, Kentdale Creek, incidental captures, Owingup Swamp, southwestern Australia, landlocked or diadromous life style

Introduction

The Trout Minnow, *Galaxias truttaceus* Valenciennes, 1846, is a native freshwater fish that occurs in coastal drainages of Tasmania, southern Victoria, major islands of the Bass Strait and also a number of rivers in southwestern Western Australia (Allen *et al.* 2002). It is the rarest galaxiid in Western Australia, being restricted to small catchments of the Goodga and Kalgan Rivers east of Albany (Morgan 2003). The Western Australian population of *G. truttaceus* was originally described as a discrete taxon, *Galaxias truttaceus hesperius* Whitely, 1944, but was revised as a junior synonym by McDowall & Frankenburg (1981). In 2006, the Western Trout Minnow was listed as critically endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), currently making it Australia's only critically endangered freshwater fish. The species (as *G. truttaceus hesperius*) is also listed under Schedule 1 of the Western Australian *Wildlife Conservation (Specially Protected Fauna) Notice 2010* (Fauna that is rare or is likely to become extinct).

Historically, the Trout Minnow had been recorded from the catchments of the King and Kalgan Rivers (McDowall & Frankenburg 1981; Allen 1982; Morgan *et al.* 1998). Sampling between 1994 and 1996 (Morgan *et al.* 1998), and more recent surveys by the Centre for Fish and Fisheries Research (CFFR) at Murdoch University (Morgan 2003) did not record this species in either the King or Kalgan Rivers. From these surveys it was thought that the range of *G. truttaceus* was restricted to a 4 km stretch of the Goodga River and approximately 2 km of stream in the Angove River (TSSC 2006). The biology of the Goodga River/Moates Lake population of *G. truttaceus* is described in detail in Morgan (2003). These previous surveys (Morgan *et al.* 1998; Morgan 2003; TSSC 2006) included a number of sampling sites on the Kent and Styx Rivers and their tributaries, to the west of Denmark.

Apart from the cluster of known occurrences in the catchments of the Goodga River/Moates Lake and Angove River, the only other confirmed record (from a search of the NatureMap database; Department of Environment and Conservation 2010) for the Trout Minnow is a single specimen collected from the Owingup Creek (on Board Road, approximately 23 km west of Denmark) in 1990 (Dr Sue Morrison, Western Australian Museum, pers. comm., January 2010). The longitude for this record was incorrectly entered into the Western Australian Museum database, and this error was consequently carried through to Morgan *et al.* (1998: Table 10, page 88). The Owingup Creek is not part of the Kent River, as it flows into Owingup Swamp.

This paper describes the discovery of a population of the Trout Minnow in the Kentdale Creek, which flows into the Kent River. At present, this population is known only from four separate specimens, captured between October 2005 and October 2009.

Methods

The Kentdale Creek is situated approximately 27 km west of Denmark on the southern coast of Western Australia (Figure 1), and flows westward through farmland, remnant karri forest and tree plantations into the Kent River.

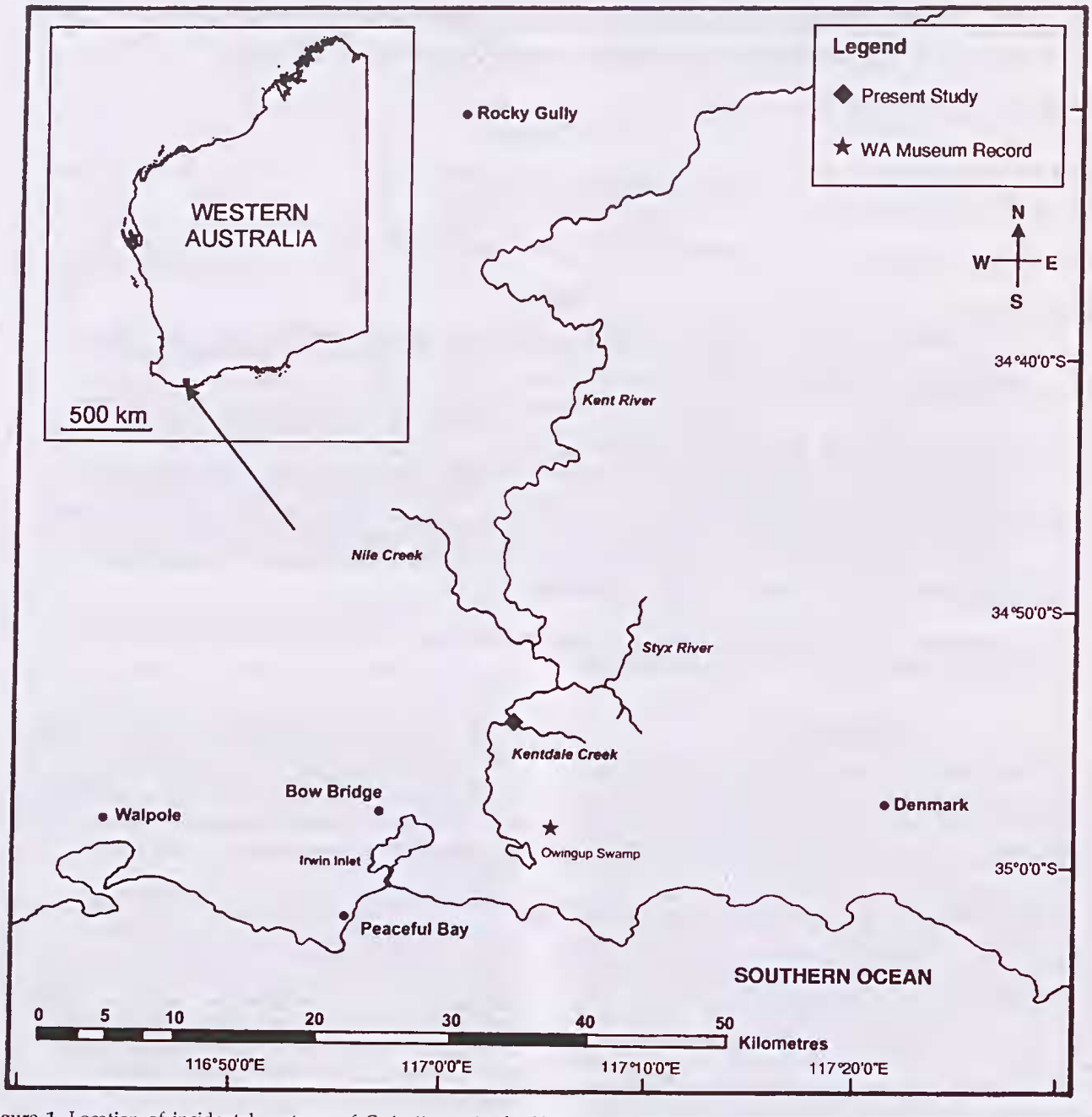

Figure 1. Location of incidental captures of *G. truttaceus* in the Kent River catchment, and historical record for this species in the Owingup Creek.

The catchment area of this system is approximately 7.5 km^2, and all of this area is on private property or unallocated crown land. Only the lower 250 m length of the creek was sampled in this study, between where it flows through a culvert under Parker Road and the junction of the creek with the Kent River. All of this lower extent of the creek, which is approximately 1.5–2.0 m wide but includes a number of larger pools, is located on a 1.35 ha forested block owned by the author. From the study area, the Kent River flows south and drains into Owingup Swamp (Figure 1).

Sampling in the creek was restricted to a number of random episodes covering a few days in October and November each year, when the creek was at its maximum height. Additionally, some sampling was conducted sporadically in the adjacent stretch of the Kent River, to a distance of approximately 200 m upstream and downstream of the junction with the creek. Fish were captured using either a hook and line, baited with worms, or a collapsible fish trap (600 x 400 x 250 mm rectangular volume enclosed in a 10 mm nylon mesh, with two funnel entrances giving access to a baited pouch). The fish trap was baited with a variety of baits, including commercial marron food, and it was used in areas where the water depth was deeper than 400 mm. Neither capture method would have captured small fish—the sampling was biased to larger sized specimens and therefore these records represent only incidental captures. No repeated sampling was undertaken as part of this study.

Captured *G. truttaceus* specimens were photographed, and the total length (TL) of each specimen was measured prior to the fish being either released alive back into the creek, or preserved for taxonomic identification and genetic studies at the CFFR.

Results

Over the period October 2005 to October 2009, a total of four specimens of *G. truttaceus* were captured from the lower stretch of the Kentdale Creek (Table 1).

Specimen A, captured in October 2005, was not photographed or measured prior to being returned alive to the creek. Based on a preliminary identification that this fish could be *G. truttaceus*, further opportunistic sampling in Kentdale Creek was undertaken in early November 2005, and Specimens B and C were taken during a two day sampling episode. After photographs and TL measurements were made, both specimens were euthanised by chilling. Specimen B was preserved in methylated spirits and Specimen C was frozen, prior to being transported to Perth and passed on to Dr David Morgan at the CFFR. Specimen D, captured in early October 2009, was photographed and measured before being returned alive to the creek. Photographs of Specimens B, C and D are provided in Figure 2.

Table 1

Capture dates, capture method and TL measurements for the four specimens of *G. truttaceus* taken from the Kentdale Creek.

Specimen	Capture date	Capture method	Size (TL mm)
Specimen A	05/10/2005	Hook and line	140 (estimated)
Specimen B	11/11/2005	Hook and line	140
Specimen C	12/11/2005	Baited fish trap	165
Specimen D	08/10/2009	Baited fish trap	180

All four specimens had TLs ≥140 mm (Table 1; Figure 2) and the two largest specimens (C and D) were both captured using the fish trap in the same large pool on the creek. It is possible that Specimens A and B were the same individual, as both were captured within a few weeks of each other at the same location on the creek. Despite sporadic sampling on other occasions during late winter/early spring between 2005 and 2009, in both Kentdale Creek and adjoining stretch of the Kent River, no other specimens of *G. truttaceus* were captured. Hence, at present this population is known only from these four incidental captures.

Genetic samples and measurements have been taken from Specimens B and C by researchers at the CFFR.

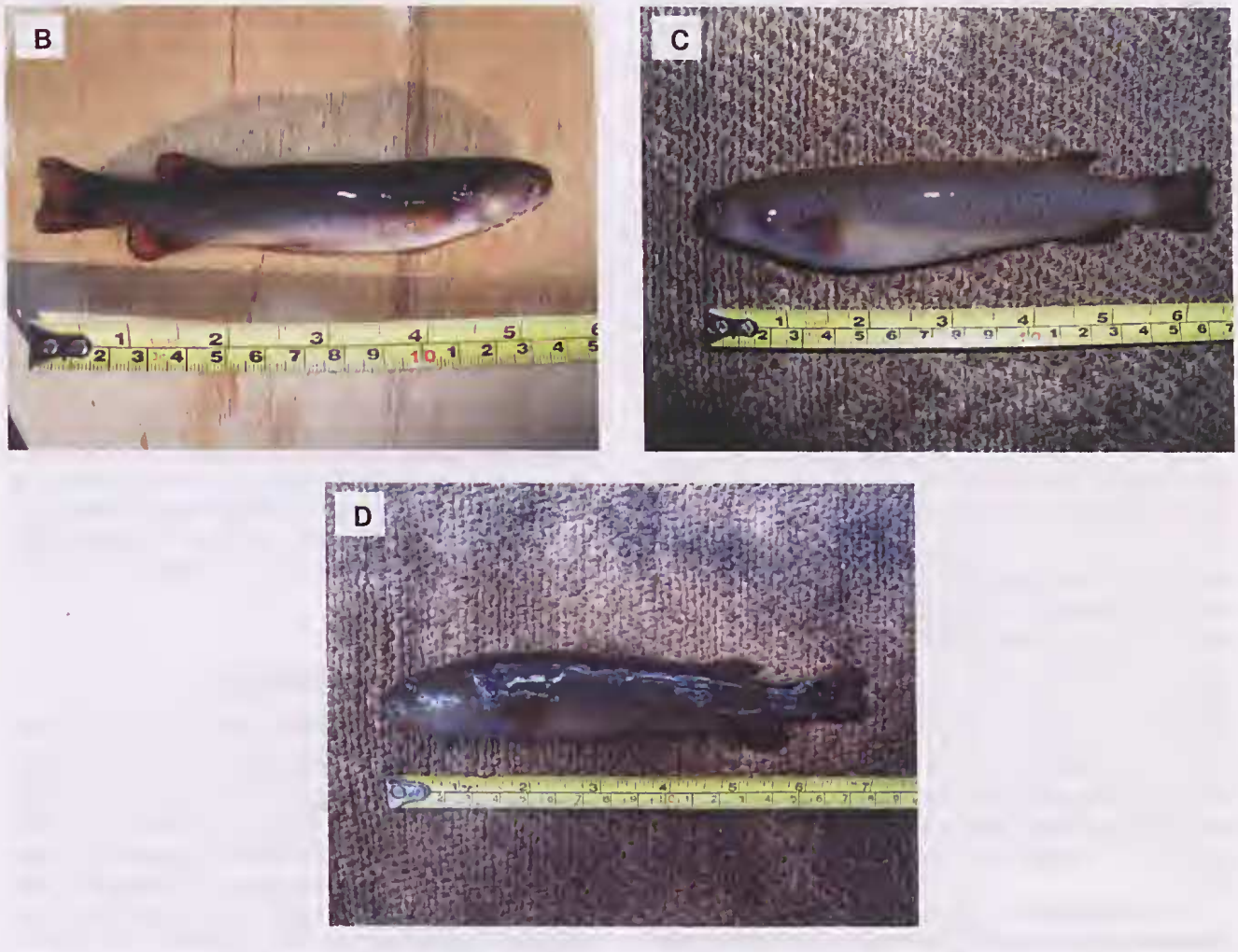

Figure 2. Photographs of *G. truttaceus* specimens captured in the Kentdale Creek in November 2005 (B and C) and October 2009 (D).

Both specimens are currently stored in 100% ethanol and will eventually be lodged in the Western Australian Museum fish collection (Dr David Morgan, CFFR, pers. comm., August 2009).

Large numbers of another native galaxiid, the Western Minnow (*Galaxias occidentalis* Ogilby, 1899), were captured in both the Kentdale Creek and the adjoining stretch of the Kent River using both sampling methods. Some specimens of Western Pygmy Perch (*Edelia vittata* Castelnau, 1873) were also taken using the fish trap. *E. vittata* and *G. occidentalis* are the most common and widespread of the freshwater fishes endemic to southwestern Western Australia (Morgan *et al.* 1998; Allen *et al.* 2002).

Discussion

The Kent River population of the Trout Minnow occurs at a location approximately 94 km further west along the south coast from the Goodga River/Moates Lake location, which represents a significant range extension for this rare, and critically endangered, galaxiid. Previously, the species was thought to be restricted to two small populations occurring along a 4 km stretch of the Goodga River and approximately 2 km of stream in the Angove River, with an estimated extent of occurrence of just 0.012 km^2 (TSSC 2006). The occurrence of *G. truttaceus* in vicinity of the Kent River area (in the Owingup Creek) has not been realised previously, as a result of an incorrect record for the specimen in the Western Australian Museum database.

The Kentdale Creek dries completely during the period December to May and usually there are no remnant habitats along the length of the creek during this period. Therefore, any fish utilising it as a habitat must either move downstream into the adjoining stretch of the Kent River, which continues to flow even during the driest months, or perish. Therefore, it is likely that the population uses the Kent River as its main refuge, and opportunistically colonises seasonal creeks. The extent of the population of the Trout Minnow in the Kent River is currently unknown.

All four specimens captured were large, adult fish with TL ≥140 mm (Table 1; Figure 2). These were presumably mature individuals, as Morgan (2003) reported a length at first maturity of 73.4 mm for females and 59.4 mm for males for the Goodga River/Moates Lake population of *G. truttaceus*. The largest individuals recorded from the Goodga River measured 151 mm TL, while the largest from the Angove River measured 168 mm TL (Morgan & Beatty 2005, 2006). Hence, the largest of the specimens captured in the Kentdale Creek (Specimen D, 180 mm TL) was 12 mm longer than the maximum size previously recorded in Western Australia. It has to be recognised that the records from the Kentdale Creek are incidental captures only, and did not result from any intensive sampling effort. As the capture methods used would tend to select larger specimens, no conclusions concerning population structure can be made.

It is possible that spawning in the Kent River population occurs in mid to late autumn, as it does in the Goodga and Angove Rivers (Morgan 2003). The population could have either a landlocked or diadromous life style. If the population is landlocked it is likely that the adults move upstream to spawn and then the larvae are transported downstream to Owingup Swamp, where they feed for the next 2–3 months before the juveniles migrate back up into the Kent River and its tributaries. If the population is diadromous, the adults would migrate downstream to the Irwin Inlet to spawn, with larvae spending some time feeding in the open sea.

Owingup Swamp drains into the Irwin Inlet via swamplands and a channel connecting the two water bodies. The Irwin Inlet is usually open to the Southern Ocean every winter, with the natural and, in some years, artificial removal of the sandbar at its mouth (Hodgkin & Clark 1988; Bancroft *et al.* 1997). Therefore, the Kent River population of *G. truttaceus* could be either landlocked, as is the case with the Goodga River population (Morgan 2003), or diadromous, which is the life style of several populations in southeastern Australia (McDowall & Frankenburg 1981; Humphries 1989, 1990). This would have to be determined by further studies.

The only other confirmed record for *G. truttaceus* in the Kent River area is a specimen captured from the Owingup Creek, which also drains into Owingup Swamp (Figure 1). Despite several surveys (Jaensch 1992; Morgan *et al.* 1998) no records of juvenile or adult Trout Minnow exist for Owingup Swamp, which has been classified as the most important wetland across the south coast of Western Australia in terms of species richness, with eight native fish species recorded (Jaensch 1992). Owingup Swamp, which is contained wholly within the Owingup Nature Reserve, may be critical for the survival of the Kent River Trout Minnow population, as it may (if the population has a landlocked life style) provide the lacustrine environment that functions as a nursery and feeding area for larval fish before they migrate back up the Kent River in the spring.

Significant threats to the Kent River population of *G. truttaceus* probably include declining water quality (as a result of land clearing and increasing salinity and nutrient levels in the Upper Kent River Catchment), loss of riparian vegetation, and stock access along the banks of its tributaries. The use of biological poisons on blue gum plantations in the catchment, the introduction of exotic fish species, disease and parasitic infections, and the construction of dams and weirs (which introduce an impassable barrier to upstream migration of juvenile fish) could represent additional threats to this population (Morgan *et al.* 1998; Morgan 2003; Gillespie 2006; TSSC 2006).

Conclusion

At present, the Kent River population of the Trout Minnow is known only from four incidental captures along a short length of the Kentdale Creek between 2005 and 2009. A dedicated study is required to determine the size, distribution, biology, migration patterns and status of the Kent River population of Australia's only freshwater fish that is listed as critically endangered. This research effort, which should be consistent with the objectives and actions of the Recovery Plan for *G. truttaceus hesperius* (Department of Environment and

Conservation 2008), will provide a better understanding of potential threats to the population and ensure its ongoing protection and conservation.

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